

CLAIMS

1 1. A modular shade system with solar tracking panels for use on a support surface
2 comprising:

3 a series of generally North-South oriented, spaced apart torque tubes, each torque tube having an
4 axis;

5 panels mounted to at least some of the torque tubes to create spaced-apart rows of panels along
6 said torque tubes, at least some of the panels being solar collector panels;

7 a shade structure positioned at a selected location between selected ones of the torque tubes and
8 above the support surface so to provide an enhanced shaded region thereunder;

9 a support structure comprising:

10 a first mounting assembly mounting each torque tube above the support surface for
11 rotation about the axis of each said torque tube; and

12 a second mounting assembly supporting the shade structure at the selected location; and
13 a tilting assembly selectively rotating each torque tube about its axis.

1 2. The system according to claim 1 wherein the first mounting assembly comprises:
2 pivot connectors;

3 Southside supports pivotally connected to the torque tubes by the pivot connectors; and
4 Northside supports pivotally connected to the torque tubes by the pivot connectors.

1 3. The system according to claim 1 wherein the Southside and Northside supports comprise
2 vertical posts.

1 4. The system according to claim 1 wherein the second mounting assembly comprises
2 vertically extending posts supporting East-West extending shade support bars.

1 5. The system according to claim 1 wherein the tilting assembly comprises a drive element
2 associated with each torque tube, a drive element coupler operably coupling each drive element, and a
3 driver drivingly coupled to at least one drive element or drive element coupler so to simultaneously

4 rotate the torque tubes about their associated axes and simultaneously tilt the panels mounted to the
5 torque tubes.

1 6. The system according to claim 1 wherein the solar collector panels comprise a light
2 concentrator type of solar collector panel.

1 7. The system according to claim 1 wherein the solar collector panels comprise a light
2 concentrator type of photovoltaic (PV) panel.

1 8. The system according to claim 1 wherein the panels are modular panels.

1 9. The system according to claim 8 wherein the modular panels comprise light-transmissive
2 panels.

1 10. The system according to claim 9 wherein the light-transmissive panels are placed
2 adjacent to one another.

1 11. The shading system according to claim 8 wherein the modular panels comprise PV panels
2 and light-transmissive panels.

1 12. The system according to claim 8 wherein the modular panels comprise PV panels.

1 13. The system according to claim 12 further comprising protective panels mounted opposite
2 the lower surfaces of the PV modules.

1 14. The system according to claim 13 wherein the protective panels comprise at least one of
2 wire mesh, sheet metal, perforated sheet metal, plastic, perforated plastic, cement board, perforated
3 cement board, and phosphorescent material.

1 15. The system according to claim 13 wherein the PV modules and the protective panels are
2 constructed to permit some light to pass therethrough.

1 16. The system according to claim 13 wherein the protective panels have a convex lower
2 surface.

1 17. The system according to claim 13 wherein the protective panels are perforated.

1 18. The system according to claim 8 wherein the modular panels comprise phosphorescent
2 modular panels to provide passive nighttime illumination beneath support structure.

1 19. The system according to claim 8 wherein the modular panels comprise illuminated
2 panels.

1 20. The system according to claim 8 wherein the modular panels comprise space cooling
2 elements comprising at least one of spray misters for evaporative cooling, fans, pumps, wetted canvas,
3 water storage containers, tubing, and evaporative spouts.

1 21. The system according to claim 1 further including modular features for multi-
2 functionality and customization.

1 22. The system according to claim 21 wherein said modular features include elements for
2 space cooling comprising at least one of spray, fans, pumps, wetted canvas, water storage containers,
3 tubing, and evaporative spouts.

1 23. The system according to claim 21 wherein said modular features include elements for
2 water collection and drainage.

1 24. The system according to claim 21 wherein said modular features comprise acoustical
2 control panels.

1 25. The system according to claim 21 wherein said modular features comprise at least one of
2 seating elements, planting elements, playground elements, restroom elements, signage elements,
3 antennae modules, payment machines, and stage elements.

1 26. The system according to claim 21 wherein said modular features comprise a rail
2 transportation element.

1 27. The system according to claim 21 wherein said modular features comprise a fuel cell
2 charging system.

1 28. The system according to claim 21 wherein said modular features comprise a hydrogen
2 production device.

1 29. The system according to claim 21 wherein said modular features comprise a hydrogen
2 storage device.

1 30. The system according to claim 21 wherein said modular features comprise inverters for
2 converting dc to ac electricity.

1 31. The system according to claim 21 wherein said modular features comprise electrical
2 wireways.

1 32. The system according to claim 21 wherein said modular features comprise elements
2 which facilitate roller skating, ice skating, car shows, horse riding, housing the homeless, farmers
3 markets, soccer matches, tennis matches, concerts, lightshows, fitness, transportation nodes.

1 33. A modular shade system with solar tracking panels comprising:
2 a support surface;
3 a series of generally North-South oriented, spaced apart torque tubes, each torque tube having an
4 axis;
5 panels mounted to at least some of the torque tubes to create spaced-apart rows of panels along
6 said torque tubes, at least some of the panels being solar collector panels;
7 a shade structure positioned at a selected location between selected ones of the torque tubes and
8 above the support surface so to provide an enhanced shaded region thereunder;
9 a support structure comprising:

10 a first mounting assembly mounting each torque tube above the support surface for
11 rotation about the axis of each said torque tube; and

12 a second mounting assembly supporting the shade structure at the selected location; and
13 a tilting assembly selectively rotating each torque tube about its axis.

1 34. The system according to claim 33 wherein the support surface comprises the ground.

1 35. The system according to claim 33 wherein the support surface comprises a roof.

1 36. The system according to claim 33 wherein the support surface comprises a vehicular
2 parking area having parking stalls at the enhanced shaded region and the traffic regions adjacent to the
3 parking stalls.